

E'
cont'd

sheet; and

a fluid flowfield formed in one or more faces of the sheet.

9.(Amended) [The] A bipolar plate [of claim 7,] for electrochemical cells, comprising:

a porous, electrically conducting sheet selected from the group consisting of expanded metal mesh, metal foam, conducting polymer foam, porous conductive carbon material and combinations thereof;

a gas impermeable material disposed within the sheet to form a gas barrier, wherein the gas impermeable material is a polymer selected from the group consisting of water permeable polymers, thermoplastic polymers, reactively cured polymers, and combinations thereof; and

a flowfield formed in the sheet.

10. (Amended) [The] A bipolar plate [of claim 7,] for electrochemical cells, comprising:

a porous, electrically conducting sheet selected from the group consisting of expanded metal mesh, metal foam, conducting polymer foam, porous conductive carbon material and combinations thereof;

a gas impermeable material disposed within a portion of the sheet to form a gas barrier, wherein the gas impermeable material is an epoxy; and

a flowfield formed in the sheet.

11. (Amended) [The] A bipolar plate [of claim 7,] for electrochemical cells, comprising:

a porous, electrically conducting sheet selected from the group consisting of expanded metal mesh, metal foam, conducting polymer foam, porous conductive carbon material and combinations thereof;

a gas impermeable material disposed within a portion of the sheet to form a gas barrier, wherein the gas impermeable material is a thermoplastic polymer selected from the group consisting of polyethersulfone (PES), nylon, and polycarbonate; and

a flowfield formed in the sheet.

E2

SUB

F3

E

E2
SUB
F3

12. (Amended) [The] ~~Δ~~ bipolar plate [of claim 7,] for electrochemical cells, comprising:
a porous, electrically conducting sheet selected from the group consisting of
expanded metal mesh, metal foam, conducting polymer foam, porous conductive carbon
material and combinations thereof;
a gas impermeable material disposed within a portion of the sheet to form a gas
barrier, wherein the gas impermeable material is a perfluorinated sulfonic acid polymer;
and
a flowfield formed in the sheet.

SUB
F4
RB

16. (Amended) [The] ~~Δ~~ bipolar plate [of claim 7,] for electrochemical cells, comprising:
a porous, electrically conducting sheet selected from the group consisting of
expanded metal mesh, metal foam, conducting polymer foam, porous conductive carbon
material and combinations thereof;
a gas impermeable material disposed within a portion of the sheet to form a gas
barrier, wherein the gas impermeable material is disposed within a face of the sheet[.];
a flowfield formed in the sheet; and [further comprising]
a second porous, electrically conducting sheet selected from the group consisting
of expanded metal mesh, metal foam, conducting polymer foam, porous conductive
carbon material and combinations thereof, wherein the second porous sheet is in electrical
contact with the face of the porous sheet having the gas barrier.

F
40
20.

^{separator}
(Amended) A bipolar plate for electrochemical cells, consisting essentially of:
a porous, electrically conducting sheet selected from the group consisting of
expanded metal mesh, metal foam, conducting polymer foam, porous conductive carbon
material and combinations thereof; and
a gas impermeable material disposed within pores of a [minor] portion of the
sheet to form a gas barrier that prevents communication of gas between opposing faces of
the sheet.

E4

25

F 148/149 ^{separator} 38. (Amended) A bipolar plate for electrochemical cells, comprising:

a porous, electrically conducting sheet selected from the group consisting of expanded metal mesh, metal foam, conducting polymer foam, porous conductive carbon material and combinations thereof; and

a gas impermeable material disposed within a [minor] portion of the sheet to form a gas barrier, wherein the gas impermeable material is an epoxy.

E5 148/149 ^{separator} 39. (Amended) A bipolar plate for electrochemical cells, comprising:

a porous, electrically conducting sheet selected from the group consisting of expanded metal mesh, metal foam, conducting polymer foam, porous conductive carbon material and combinations thereof;

a gas impermeable material disposed within a [minor] portion of the sheet to form a gas barrier, wherein the gas impermeable material is disposed within a face of the sheet; and

a second porous, electrically conducting sheet selected from the group consisting of expanded metal mesh, metal foam, conducting polymer foam, porous conductive carbon material and combinations thereof, wherein the second porous sheet is in electrical contact with the face of the porous sheet having the gas barrier.

E6 148/149 ^{SUB} 39. (Amended) The bipolar plate of claim 7, wherein [the] a flowfield is formed by the open pores in the porous electrically conducting [member] sheet.

F 148/149 ^{separator} 42. (Amended) The bipolar plate of claim [7] 22, wherein the flowfield is a gas flowfield.~

E7 148/149 ^{separator} 42. (Amended) The bipolar plate of claim [7] 22, wherein the flowfield is a liquid flowfield.~

E7 ⁵⁰ ~~44~~ ^{separator} (Amended) A bipolar plate for electrochemical cells, comprising:
 a porous, electrically conducting sheet selected from the group consisting of expanded metal mesh, metal foam, conducting polymer foam, porous conductive carbon material and combinations thereof; and
 a gas impermeable material disposed within a first portion of the sheet to form a gas barrier preventing communication of gas between opposing faces of the sheet and leaving a second portion of the sheet to serve as a fluid flowfield.

Please enter the following new claims:

F ⁴⁹ ~~45~~ ^{separator} The bipolar plate of claim ~~36~~ ⁴⁸, wherein the gas impermeable material is selected from the group consisting of polymers and metals.-

F ⁵⁰ ~~46~~ ^{separator} The bipolar plate of claim ~~36~~ ⁴⁸, wherein the gas impermeable material is a polymer selected from the group consisting of water permeable polymers, thermoplastic polymers, reactively cured polymers, and combinations thereof.-

E8 F ⁵¹ ~~47~~ ^{separator} The bipolar plate of claim ~~36~~ ⁴⁸, wherein the gas impermeable material is an epoxy.-

F ⁵² ~~48~~ ^{separator} The bipolar plate of claim ~~36~~ ⁴⁸, wherein the gas impermeable material is a thermoplastic polymer selected from the group consisting of polyethersulfone (PES), nylon, and polycarbonate.-

SUB F7 ~~49~~ The bipolar plate of claim ~~36~~, wherein the gas impermeable material is a perfluorinated sulfonic acid polymer.-

~~50~~ The bipolar plate of claim 7, wherein the gas impermeable material is selected from titanium, nickel, stainless steel, aluminum, magnesium, gold or combinations thereof.-

~51. The bipolar plate of claim 21, wherein the metal sheet is selected from titanium, nickel, stainless steel, aluminum, magnesium, gold or combinations thereof.~

SUB
F8

~52. The bipolar plate of claim 36, wherein the gas impermeable material is selected from titanium, nickel, stainless steel, aluminum, magnesium, gold or combinations thereof.~

F ^{9 separator}
~53. The bipolar plate of claim 1, wherein the gas barrier prevents communication of gas between opposing faces of the sheet.~

E8 ^{20 separator 19}
~54. The bipolar plate of claim 5, wherein the gas barrier prevents communication of gas between opposing faces of the sheet.~

F ^{22 separator 21}
~55. The bipolar plate of claim 10, wherein the gas barrier prevents communication of gas between opposing faces of the sheet.~

F ^{24 separator 23}
~56. The bipolar plate of claim 11, wherein the gas barrier prevents communication of gas between opposing faces of the sheet.~

F ^{26 separator 25}
~57. The bipolar plate of claim 12, wherein the gas barrier prevents communication of gas between opposing faces of the sheet.~

F ^{28 separator 27}
~58. The bipolar plate of claim 13, wherein the gas barrier prevents communication of gas between opposing faces of the sheet.~

F ^{30 separator 29}
~59. The bipolar plate of claim 20, wherein the gas barrier prevents communication of gas between opposing faces of the sheet.~

F ^{45 separator 44}
~60. The bipolar plate of claim 21, wherein the gas barrier prevents communication of gas between opposing faces of the sheet.~